



IB MYP YEAR 5

Year 10 Standard Mathematics

Assessment  
**BOARD BASED ASSESSMENT SOL**

Name: \_\_\_\_\_ ( 10 )

Teacher: **Miss Luk**

Date of task:

Time allowed: **70 min**

Student's <b>Performance</b> in Different <b>Criterion</b>	
<b>A</b>	

**INSTRUCTIONS:**

- ◆ Read the instructions for all questions carefully.
- ◆ Write on the lined paper provided.
- ◆ Show all work, steps and proper units.
- ◆ Ask the teacher for scrap paper, but any work on the scrap paper will **NOT** be marked.
- ◆ The use of scientific calculator is allowed.
- ◆ The use of **non-electronic dictionary** is allowed.

**ASSESSMENT:**

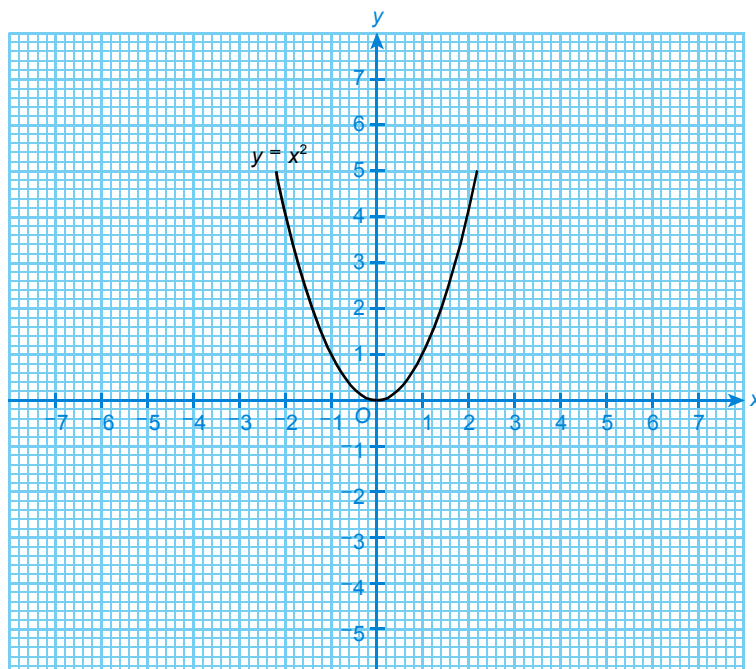
- ◆ Read the criteria descriptors carefully before you start your work. This will give you a clear understanding of what is required and what a quality piece of work for this task must include. This way you give yourself the best chance of achieving the highest level in this task.
- ◆ This task assesses Criteria **A**.

### Criterion A: Knowledge and understanding

Achievement level	Task Specific Rubric	IBO Published Descriptor	Student's self-evaluation
<b>0</b>	The student does not reach a standard described by any of the descriptors given below.	The student does not reach a standard described by any of the descriptors given below.	(0-8)
<b>1-2</b>	The student can solve <b>some</b> simple problems.	The student <b>attempts</b> to make deductions when solving <b>simple</b> problems in <b>familiar</b> contexts.	
<b>3-4</b>	The student can solve <b>most</b> simple and <b>some</b> more complex problems.	The student <b>sometimes</b> makes <b>appropriate</b> deductions when solving <b>simple and more-complex</b> problems in <b>familiar</b> contexts	Teacher's Final Grade
<b>5-6</b>	The student can solve <b>challenging</b> problem correctly and <b>most</b> familiar problems along with <b>all</b> different types of problems.	The student <b>generally</b> makes <b>appropriate</b> deductions when solving <b>challenging</b> problems in a <b>variety</b> of <b>familiar</b> contexts.	(0-8)
<b>7-8</b>	The student can solve <b>most</b> challenging and <b>most</b> familiar problems along with <b>all</b> different types of problems.	The student <b>consistently</b> makes <b>appropriate</b> deductions when solving <b>challenging</b> problems in a <b>variety</b> of contexts including <b>unfamiliar</b> situations.	

## Simple Questions

1. The figure shows the graph of the function  $y = x^2$ . Describe the way of transforming the given graph to the graph of each of the following functions, and sketch the graph of each function on the same figure. (label each equation clearly)



- (a)  $y = x^2 - 2$   
(b)  $y = (x - 4)^2$   
(c)  $y = 2 + (x + 3)^2$

**S**OLUTION

(a) The transformation is translating 2 units downwards.

(b) The transformation is translating 4 units to the right.

(c)  $\because y = 2 + (x + 3)^2$   
 $\qquad = (x + 3)^2 + 2$

$\therefore$  The transformation is translating 3 units to the left and 2 units upwards.

2. It is given that 4, 7, 10, 13, ... is an arithmetic sequence.

(a) Find the general term of the sequence.

(b) Find the 25th term of the sequence.

**S**OLUTION

(a) First term  $a = 4$

$$\begin{aligned}\text{Common difference } d &= 7 - 4 \\ &= 3\end{aligned}$$

$$\begin{aligned}\text{General term } T_n &= a + (n - 1)d \\ &= 4 + (n - 1) \times 3 \\ &= 4 + 3n - 3 \\ &= \underline{\underline{3n + 1}}\end{aligned}$$

$$\begin{aligned}\text{(b) } T_{25} &= 3(25) + 1 \\ &= \underline{\underline{76}}\end{aligned}$$

### More Complex Questions

3. Solve the equation  $\frac{x^2}{4} - \frac{x}{3} = \frac{1}{3}$  by the quadratic formula. (Express the answers in surd form if necessary.)

**S**OLUTION

$$\begin{aligned}\frac{x^2}{4} - \frac{x}{3} &= \frac{1}{3} \\ 3x^2 - 4x &= 4 \\ 3x^2 - 4x - 4 &= 0\end{aligned}$$

By the quadratic formula,

$$\begin{aligned}x &= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-4)}}{2(3)} \\ &= \frac{4 \pm \sqrt{64}}{6} \\ &= \frac{4 + 8}{6} \quad \text{or} \quad \frac{4 - 8}{6} \\ &= \underline{\underline{2}} \quad \text{or} \quad \underline{\underline{-\frac{2}{3}}}\end{aligned}$$

4. Simplify  $\frac{72a^{3n-4}}{12a^{8-2n}}$ , where  $n$  is an integer and  $a$  is a non-zero real number.

**S**OLUTION

$$\begin{aligned}\frac{72a^{3n-4}}{12a^{8-2n}} &= 6a^{(3n-4)-(8-2n)} \\ &= \underline{\underline{6a^{5n-12}}}\end{aligned}$$

### Challenging Questions

5. The area of a rectangle is  $165 \text{ cm}^2$ . It is given that the width of the rectangle is 4 cm shorter than the length, find the length and the width of the rectangle.

**S**OLUTION

Let the width of the rectangle be  $x$  cm, then the length of the rectangle is  $(x + 4)$  cm.

$$\therefore x(x + 4) = 165$$

$$x^2 + 4x - 165 = 0$$

$$(x - 11)(x + 15) = 0$$

$$x = 11 \text{ or } x = -15 \text{ (rejected)}$$

$$\therefore \text{Length of the rectangle} = (11 + 4) \text{ cm}$$

$$= \underline{\underline{15 \text{ cm}}}$$

$$\text{Width of the rectangle} = \underline{\underline{11 \text{ cm}}}$$

6. Solve the equation  $9^{7x-3} = 81(27^{2x-2})$ .

**S**OLUTION

$$9^{7x-3} = 81(27^{2x-2})$$

$$(3^2)^{7x-3} = (3^4)(3^3)^{2x-2}$$

$$3^{14x-6} = 3^{4+6x-6}$$

$$3^{14x-6} = 3^{6x-2}$$

$$\therefore 14x - 6 = 6x - 2$$

$$8x = 4$$

$$x = \underline{\underline{\frac{1}{2}}}$$

### Unfamiliar Questions

7. Find the general term of the geometric sequence  $8x, 32x^2, 128x^3, 512x^4, \dots$ , where  $x \neq 0$ . (Express your answer in terms of  $x$ .)

**S**OLUTION

First term  $a = 8x$

$$\text{Common ratio } r = \frac{32x^2}{8x} = 4x$$

$$\begin{aligned}\text{General term } T_n &= ar^{n-1} \\ &= 8x(4x)^{n-1} \\ &= 2(4x)(4x)^{n-1} \\ &= \underline{\underline{2(4x)^n}}\end{aligned}$$

8. (a) Factorize  $3x^2 - 8x - 3$  and  $x^2 - x - 6$ .

(b) Hence simplify  $\frac{3(a^2)^n - 8a^n - 3}{(a^2)^n - a^n - 6}$ .

**S**OLUTION

(a)  $3x^2 - 8x - 3 = \underline{\underline{(3x+1)(x-3)}}$

$$x^2 - x - 6 = \underline{\underline{(x+2)(x-3)}}$$

(b) Let  $x = a^n$ .

$$\begin{aligned}\therefore \frac{3(a^2)^n - 8a^n - 3}{(a^2)^n - a^n - 6} &= \frac{3(a^n)^2 - 8a^n - 3}{(a^n)^2 - a^n - 6} \\ &= \frac{3x^2 - 8x - 3}{x^2 - x - 6} \\ &= \frac{(3x+1)(x-3)}{(x+2)(x-3)} \\ &= \frac{3x+1}{x+2} \\ &= \underline{\underline{\frac{3a^n+1}{a^n+2}}}\end{aligned}$$